How to Make

HONEY-CREAM

A Mixture of High-Test Sweet Cream and Extracted Honey

By P. H. TRACY

UNIVERSITY OF ILLINOIS
AGRICULTURAL EXPERIMENT STATION
Bulletin No. 387

CONTENTS

PAGE

Obtaining Cream With Necessary Fat Content 547

Mixing the Honey and Cream 551

Proportion of Honey to Cream 551

Packaging Honey-Cream 552

Kinds of Honey to Use 552

Adding Flavorings to Honey-Cream 553

Keeping Qualities of Honey-Cream 553

Rancidity Prevented by Heating Honey 554

Tallowiness and Rancidity Influenced by Proportion of Honey 554

Summary 555

Urbana, Illinois December, 1932

Publications in the Bulletin series report the result of investigations made by or sponsored by the Experiment Station

How to Make Honey-Cream

By P. H. Tracy, Associate Chief in Dairy Manufacturers[1]

HONEY-CREAM is a mixture of high-test sweet cream and extracted honey developed at the University of Illinois creamery. It has had a ready market with the patrons of the creamery, and is believed to have interest to cream and honey producers and manufacturers as furnishing another outlet for these products.

Honey-cream has a much firmer consistency than honey, and for that reason is more convenient to serve. Since it contains a large proportion of butterfat, no butter is needed to precede it as a spread.

This bulletin describes the methods and materials used in preparing this new combination.

Obtaining Cream With Necessary Fat Content

In the manufacture of honey-cream it is necessary to use cream that has a very high fat content—70 to 80 percent. The method to use to obtain such cream depends upon the type of separator available.

In this study DeLaval machines Nos. 12 and 32 were used. These separators were equipped by the manufacturers with tinware especially constructed for handling the viscous high-test cream. There is no reason why other machines could not be adapted for this type of separation by using special cream covers and milk-flow regulators. In preliminary runs it was found possible to use the large-power separator (No. 32) with its regular tinware and obtain a high-test cream by reducing the rate of inflow to about one-half, but when this procedure was followed with the small machine (No. 12) the heavy cream would not flow thru the cream spout.

Results With Farm Size Separator.—The results obtained with the small separator equipped with special tinware and operated under different conditions intended to produce a high-test cream are represented by the data given in Table 1.

The following deductions can be made from the data in this table:

1. The highest capacity possible with the special tinware was about 50 percent of the capacity obtainable with standard equipment.

2. A greater capacity resulted from adjusting the cream screw for a high-test cream, other conditions remaining the same.

3. The greatest capacity was obtained by separating the milk at about pasteurizing temperature rather than when the temperature was lowered to 100° F.

---

[1]The author acknowledges the assistance of Dr. V. G. Milum, of the Department of Entomology of the University of Illinois, in securing samples of honey and in planning certain phases of this study.

TABLE 1.—RESULTS OBTAINED WITH FARM SIZE SEPARATOR[1] EQUIPPED TO SEPARATE HIGH-TEST CREAM

(Milk used contained 4.1 percent fat and 12.97 percent total solids)

Run No.	Rate of flow (500 lbs. = normal)	Temp. of milk	Setting of cream screw[2]	Fat in cream	Total solids in cream	Fat in skim milk	Total solids in skim milk	Flow of cream
	lbs. per hr.	*° F.*		*perct.*	*perct.*	*perct.*	*perct.*	
1	269	138	High test	74.09	76.88	.16	9.04	Free
2	255	138	Normal	70.21	72.98	.13	9.23	Free
3	183	140	Normal	75.31	78.04	.11	9.02	Free
4	232	99	High test	69.99	72.66	.18	9.14	Free
5	163	100	High test	75.72	77.96	.74	9.65	Restricted
6	134	100	Normal	75.20	77.69	.36	9.40	Restricted

[1]DeLaval No. 12. [2]The screw on this machine is in reality a skim-milk screw. The normal setting was for skimming about a 37-percent cream at 90° F.

Note.—All tests made by the Mojonnier method.

4. The highest testing cream was secured by:
   a. Setting the bowl adjustment for a high-test cream.
   b. Reducing the rate of inflow normally secured with the special tinware.
   c. Raising the temperature of the milk to 140° F.

5. The lowest fat loss resulted when separating the high-temperature milk (about 140° F.).

6. The flow of cream was less restricted when separating the high-temperature milk (about 140° F.).

The most practical procedure to follow in separating the milk is to heat it to pasteurizing temperature (142 to 145° F.)[1] and run thru the separator at that temperature with a normal inflow of milk and with the bowl adjustment set for a high-test cream. It is evident that fat losses in the skim milk will be negligible so long as the cream is not so viscous as to cause it to back up in the cream spout and run over into the skim milk.

Results With Large Separator.—The results obtained when the larger machine (No. 32) was used to separate a high-test cream are shown in Table 2. Practically the same deductions can be made from the tests on this large machine equipped with the special tinware as were made from the test runs on the small machine. It will be noted that in operating the large machine it is necessary to reduce the rate of inflow even when the special tinware is used, in order to obtain a cream testing about 75 percent fat, which is the percentage desired when mixing the cream with honey. When creams as low as 70 percent fat are used, it is necessary to reduce the proportion of honey used in order to compensate for the difference in the plasticity of the cream.

Fat Losses in Skim Milk.—It is evident that fat losses in the skim milk are negligible except when the cream is separated at a low temperature (100° F. or lower) and at a reduced rate of inflow. The excessive viscosity of the cream under these conditions probably results in a backing up of

[1]To pasteurize the milk properly it should be held at this temperature for 30 minutes.

Table 2.—Results Obtained With Large Size Separator[1] Equipped to Separate High-Test Cream

Temperature	Rate of inflow (2000 lbs. = normal)	Screw setting	Fat in cream (Mojonnier)	Fat in skim milk (Mojonnier)
		Part 1 (whole milk 3.7 percent fat)		
° F.	*lbs. per hr.*		*perct.*	*perct.*
145	1440	High test	67.83	.06
145	672	Normal	73.87	.06
90	1275	High test	64.43	.13
90	638	Normal	67.98	.13
90	2016	Normal	53.12	.13
		Part 2 (whole milk 3.9 percent fat)		
145	1458	High test	69.75	.13
145	678	Normal	74.21	.12
90	1275	High test	65.98	.10
90	638	Normal	72.40	.21
90	2016	Normal	46.69	.09

[1]DeLaval No. 32.

the cream into the skim-milk spout. When separating at pasteurizing temperature (or slightly lower[1]) this is avoided. The data in Table 3 are given to show the amount of the fat lost in skim milk when high-test cream is separated at pasteurizing temperature and the inflow of milk is reduced. The samples were taken at intervals during the separation of 100 gallons of milk.

Table 3.—Fat Loss in Samples of Skim Milk Taken at Intervals During Separation of 100 Gallons of Milk at Pasteurizing Temperature[1]

Sample No.	Cream test (Mojonnier)	Fat content of skim milk	
		Babcock	Mojonnier
	perct.	*perct.*	*perct.*
1st	72.38	.02	.078
2d	75.53	.02	.071
3d	77.10	.015	.062
4th	76.32	.02	.071
Normal inflow	57.68	.015	.048

[1]In this run the high-test cream was obtained by reducing the rate of inflow to about one-half.

It will be noted that the skim milk separated from the highest testing cream (77.10 percent fat) contained .062 percent fat, whereas that separated from the lowest testing cream (57.68 percent fat) contained .048 percent fat. The slight difference between these two tests would represent .14 pound of butterfat in each 1,000 pounds of skim milk separated. This

[1]The temperature of the milk may fall to as low as 130° F. before entering the bowl, the amount of drop depending upon the time the milk is held in the supply tank before entering the separator bowl.

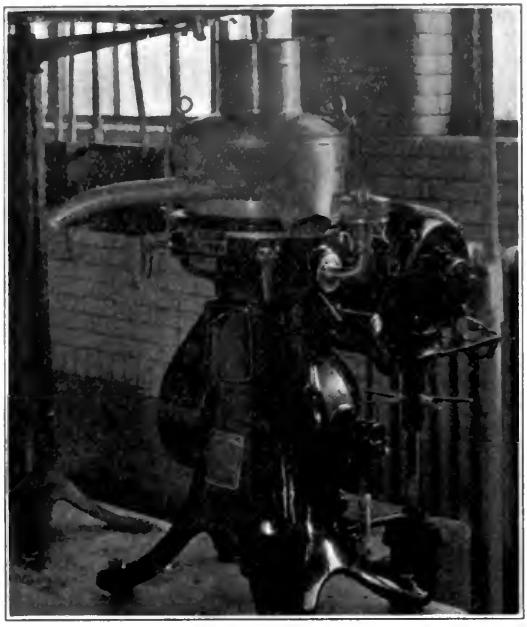

FIG. 1.—FACTORY-SIZE SEPARATOR EQUIPPED WITH SPECIAL TINWARE FOR SEPARATING CREAMS TESTING AS HIGH AS 80 PERCENT BUTTER FAT

FIG. 2.—LEFT, BOWL PARTS USED FOR SEPARATING NORMAL CREAMS; RIGHT, THOSE FOR SEPARATING HIGH-TESTING CREAMS, FACTORY-SIZE SEPARATOR

Note the smaller size of the milk-regulating tube which reduces the inflow when high-test cream is separated. Also note the larger cream outlets on the top disk used for high-test cream. These larger outlets and also the special cream cover, which is sloped from the rear to the front and which has a wider opening into the spout, result in less restriction to the flow of the high-test cream. The special cream spout is shorter and is built at a more acute angle so as to enable the heavy cream to flow more easily out of the cream cover.

Fig. 3.—Left, Bowl Parts Used in Separating Normal Creams; Right, Those for Separating High-Testing Creams, Farm-Size Separator

The smaller opening in the regulating cover on the right reduces the rate of inflow, resulting in a higher testing cream. In order to lessen the restriction to the flow of heavy cream, the cream cover shown on the right has a wider opening and a shorter spout built at a more acute angle.

amount of additional loss resulting from the separation of the higher testing cream is not large enough to be of any economic importance.

Mixing the Honey and Cream

As cream testing over 70 percent butterfat solidifies upon cooling, it is necessary to mix the cream with the honey immediately after the cream is separated. When cows are on dry feed it may be desirable to add enough butter color to the warm cream to result in a golden color when mixed with the honey. If the honey used is raw, it should be heated momentarily to at least 155° F. and either mixed with the cream at that temperature or cooled first to about 120° F. A small amount of salt (.1 percent) added at this time will improve the flavor.

The mixing can be done with a spoon in a large pan or in a mechanical mixer if such equipment is available. Care should be taken not to whip the mixture as air may be incorporated, which will cause a shrinkage to occur after the honey-cream is packaged.

Proportion of Honey to Cream

The proportion of honey to cream should be accurately determined. If too much honey is used, the mixture will not have the right consistency for spreading, yet enough honey must be added to give the desired flavor. The intensity of the honey flavor in the honey-cream varies according to the product to which it is applied. A flavor that is satisfactory in honey-cream eaten alone will be lacking when the same product is eaten with bread, a fact which should be kept in mind when mixing to suit the taste.

As different honeys vary in intensity of flavor, it may be necessary to vary the proportions of honey and cream slightly when changing from one honey to another.

At least 40 percent of honey is usually necessary to give sufficient flavor to the cream. If more than 45 percent is used, the mixture will be too fluid to handle properly. A mixture made up of 42 percent honey and 58 percent cream has been successfully manufactured and marketed by the University of Illinois creamery. When a 75-percent cream is used, these

proportions will result in a product containing about 43.5 percent fat. (A representative sample of honey-cream was found to contain 44.73 percent fat and 78.68 percent total solids.)

Packaging Honey-Cream

Honey-cream should be packaged while warm and in a fluid state. Inasmuch as one pound is the largest sized package that is likely to be marketed, no precooling is necessary if the containers are placed in a refrigerated room immediately after filling.

Either glass or paper containers may be used. A clear glass container has the advantage of displaying the contents of a jar to the prospective buyer, but it is expensive unless provision can be made for its return and it would undoubtedly lead to the development of unpleasant flavors. Studies at this Station[1] have shown that both milk and cottage cheese placed in colorless glass containers acquire a tallowy flavor if exposed to light rays, and honey-cream undoubtedly would be affected in the same manner.

Kinds of Honey to Use

As many different kinds of honey can be used for honey-cream as there are varieties of honey. To determine the popularity of some of the more common varieties, different lots of honey-cream were prepared with them, 45 percent of honey being used. Seven competent judges working independently judged the samples and arranged the five they liked best in the order of their preference. The results are given in Table 4.

The light-colored and mild-flavored honeys proved most pleasing to these judges. A sweet-clover honey has been used in the honey-cream marketed by the University of Illinois creamery and has proved very popular. There is no reason, however, why several different varieties of honey could not be used in order to have a variety of flavors from which consumers might select. The essential thing is to use a good grade of honey.[2]

---

[1]Tracy, P. H. and Ruehe, H. A. The relation of certain plant processes to the flavor development in market milk. Jour. of Dairy Science 14, 250-267, 1931. Tracy, P. H. and Ramsey, R. J. Sunlight develops off-flavors in cottage cheese. *The Milk Dealer* 21, No. 8, p. 48, 1932.

[2]The honey should meet U. S. standards for either Fancy or No. 1 grade, the specifications of which are as follows:

United States Fancy shall consist of extracted honey of any color which meets the following requirements:

1. The honey shall be *clean* (1), and free from damage caused by turbidity, overheating, fermentation, honeydew, objectionable flavor or odor, or damage caused by other means.
2. The honey shall be well ripened and shall weigh not less than 11 pounds, 12 ounces per gallon of 231 cubic inches at 68 degrees F.

United States No. 1 shall consist of extracted honey of any color which meets the following requirements:

1. The honey shall be *fairly clean* (2), and free from damage caused by turbidity, overheating, fermentation, honeydew, objectionable flavor or odor or damage caused by other means.
2. The honey shall be well ripened and shall weigh not less than 11 pounds, 12 ounces per gallon of 231 cubic inches at 68 degrees F.

(1) *Clean* means that the honey shall be at least as free from foreign material as honey which has been strained thru standard bolting cloth of 86 meshes per inch at a temperature of not more than 130 degrees F.

(2) *Fairly clean* means that the honey shall be at least as free from foreign material as honey which has been strained thru standard bolting cloth of 23 meshes per inch at a temperature of not more than 130 degrees F.

Table 4.—Comparison of Judges' Preferences for Different Flavored Honey-Creams

Honey	Color No.[1]	Color description	Number of times selected				
			1st	2d	3d	4th	5th
1. Sage	6.2	Light amber	...	...	...	...	...
2. Wild buckwheat	8.9	Amber	...	...	...	...	...
3. Clover	2.2	White	1	4	2	...	...
4. Cotton	4.4	Extra light amber	2	...	...	...	3
5. Heartsease	12.7	Dark	...	...	...	...	...
6. Tupelo	5.3	Light amber	1	...	1	...	...
7. White thistle	6.2	Light amber	...	1	...	1	...
8. Climbing milk weed	3.6	Extra light	...	...	...	1	...
9. Heartsease	5.7	Light amber	...	...	...	...	...
10. Orange	2.4	White	...	1	1	3	2
11. Sweet clover	.5	Water white	3	...	2	2	...
12. Alfalfa	5.0	Light amber	...	1	1	...	2
13. Cotton	3.5	Extra light	...	...	...	...	...

[1]As determined by Pfund honey-grader, manufactured by Haubon Company.

Adding Flavorings to Honey-Cream

By adding certain flavoring materials to honey-cream, still more variety can be obtained in this product. Chocolate, maple, sorghum, coffee, raspberry, and orange have been found especially adapted to the purpose.

When adding flavoring materials it is necessary to reduce the amount of honey used in order to maintain the proper plasticity in the mixture. It is advisable, therefore, to use as concentrated flavors as possible. In the case of sorghum it may be necessary to reduce the amount of honey to 10 percent, whereas when a true fruit-concentrated extract is used, 30 percent of honey may be added.

The proper amount of honey to mix with the cream and flavoring material will have to be determined by trial for each flavor used.

Keeping Qualities of Honey-Cream

Honey-cream is a perishable product. However, if properly made and if stored at 40° F. or lower until consumed, it usually can be kept for about two weeks without difficulty. There is sufficient honey present to retard bacterial action but the butterfat may undergo certain chemical changes that injure the flavor. If stored at room temperature, the butterfat will separate from the honey and will become tallowy in a few days. Even at 40° F. there is danger of the butterfat becoming tallowy. This flavor defect may occur in any dairy product containing butterfat and is due to an oxidation process—a reaction that is hastened by heat, acid, light, air, and certain metals such as copper and iron. Tallowiness is less common in summer than in winter, possibly because summer milk and cream is more apt to be subjected to bacterial action than milk produced during colder weather, and bacterial metabolism has been found to be a retarder of tallowiness.[1]

[1]Unpublished data, Department of Dairy Husbandry, University of Illinois.

Rancidity is another defect that may occur in honey-cream. This flavor is due to a hydrolysis of the butterfat and may be caused by enzymes present in either the honey or the cream. It is a recognized fact that the pasteurization of milk by heating at 145° F. will destroy fat-splitting enzymes, and hence it is important that the cream used in the manufacture of honey-cream be separated from pasteurized milk. The presence of lipase in honey has not been definitely proved, altho Phillips[1] states that since pollen contains fat it is likely that adult worker bees are capable of breaking down fat to its simpler constituents before absorption. That unheated honey does contain an agent capable of producing rancidity is evidenced by the data in Table 5.

Rancidity Prevented by Heating Honey

Some freshly extracted honey was heated from room temperature to 175° F. (Table 5). At 10-degree intervals from 125° F. to 175° F. a portion of the honey was removed. These different lots were then used to prepare honey-creams containing 28.6 percent honey. At the end of 7, 14, and 21 days of storage at 40° F. the samples were judged.

TABLE 5.—EFFECT OF TEMPERATURE TO WHICH HONEY IS HEATED UPON DEVELOPMENT OF RANCIDITY IN HONEY-CREAM STORED AT 40° F.

Temperature to which honey was heated	Flavor criticism at the end of—		
	7 days	14 days	21 days
°F.			
125	Slightly rancid	Rancid	Soapy and rancid
135	Slightly rancid	Rancid	Soapy and rancid
145	Good	Rancid	Soapy and rancid
155	Good	Slightly tallowy	Tallowy
165	Good	Slightly tallowy	Tallowy
175	Good	Slightly tallowy	Tallowy

It will be noted that by heating the honey to 155° F. rancidity in the honey-cream was avoided. It will also be noted that those samples that did not become rancid had all become tallowy before the end of the 21-day storage period.

Tallowiness and Rancidity Influenced by Proportion of Honey

Using both unheated and heated (175° F.) honey, mixtures of honey-cream varying from 28.6 percent to 57.1 percent honey were prepared. The samples were stored at 40° F. and after 7-, 14-, and 21-day intervals they were judged. The results are given in Table 6.

The honey-creams containing a small proportion of honey to cream were more apt to acquire either a rancid or tallowy flavor than were those samples containing a larger proportion of honey. These data, like those in Table 5, show that rancidity can be controlled by heating the honey. Tal-

[1]Phillips, E. F. Bee-keeping. Page 157. Rural Science Series (Macmillan). 1928.

Table 6.—Development of Rancidity and Tallowiness in Honey-Creams Made With Different Proportions of Honey and Stored at 40° F.[1]

Percent honey in mixture	Treatment of honey	Flavor criticism at the end of—		
		7 days	14 days	21 days
28.6	Heated	Good	Good	Strong tallowy
28.6	Unheated	Slightly rancid	Rancid	Rancid and soapy
35.7	Heated	Good	Good	Tallowy
35.7	Unheated	Slightly rancid	Rancid	Rancid and soapy
42.9	Heated	Good	Good	Slightly tallowy
42.9	Unheated	Good	Rancid	Rancid
50.0	Heated	Good	Good	Good
50.0	Unheated	Good	Slightly rancid	Rancid
57.1	Heated	Good	Good	Good
57.1	Unheated	Good	Good	Good

[1]A sample of the high-test cream used in this experiment was kept under the same conditions as these honey-creams. At the end of 28 days it was still free from off-flavors.

lowiness, however, is apt to occur in samples that are not rancid. This was particularly true of the samples containing 42.9 percent or less of honey.

SUMMARY

A method has been presented for preparing a product called honey-cream. Honey-cream is a combination of a high-test sweet cream and strained honey and is suitable for using as a spread on bread, biscuits, waffles, and the like.

The cream used should test 75 to 80 percent butterfat. This high-test cream can be obtained by using tinware made especially for this purpose for use with centrifugal separators. The milk should be heated to 142 to 145° F. for 30 minutes and then separated at that temperature with the screw adjusted for a high-testing cream. The milk used should be of high quality and free from metal contamination.

The milder flavored honeys, such as sweet clover, cotton, tupelo, white thistle, white orange, and alfalfa, proved most popular in a test of various samples of honey-cream made from thirteen different honeys. Other honeys can be used for variety. Additional flavor combinations are possible, using maple, coffee, chocolate, orange, sorghum, and raspberry. When adding flavoring materials it is necessary to reduce the amount of honey in order to obtain a product that will spread properly.

The honey should be heated to at least 155° F. momentarily and mixed with the cream while still warm in the proportions of 42 parts of honey to 58 parts of cream. The mixture is then poured into packages and immediately stored at 40° F. or lower to enable the honey-cream to cool rapidly.

Honey-cream should be kept refrigerated in order to prevent the fat from separating and to retard the development of a tallowy flavor. Rancid

flavors may result from the use of raw cream or unheated honey. No attempt should be made to keep honey-cream longer than two weeks at 40° F.

The fat content of honey-cream made as here directed (with 42 percent honey and 58 percent cream testing approximately 75 percent butterfat) will be approximately 43.5 percent and the total solids approximately 80 percent.